IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A ceramic substrate having a conductor inside thereof,

wherein the ceramic substrate is a sintered aluminum nitride substrate having a disc shape and a fractured section with intergranular fracture, and

at least one rare earth element is locally distributed in triple points of crystal grains.

Claim 2 (Previously Presented): The ceramic substrate according to claim 1, wherein an average diameter of ceramic grains of said fractured section is 0.5 to 10 μm.

Claim 3 (Canceled).

Claim 4 (Previously Presented): The ceramic substrate according to claim 1, wherein the thermal conductivity of said ceramic substrate is 100 W/m·K or more.

Claim 5 (Canceled).

Claim 6 (Previously Presented): The ceramic substrate according to claim 1, wherein said ceramic substrate has a diameter of 200 mm or more.

Claim 7 (Previously Presented): The ceramic substrate according to claim 1, wherein said ceramic substrate has a diameter of 300 mm or more.

Claim 8 (Previously Presented): The ceramic substrate according to claim 1, wherein said ceramic substrate has a thickness of 25 mm or less.

Claims 9-12 (Canceled).

Claim 13 (Previously Presented): A semiconductor producing/examining device comprising the ceramic substrate according to Claim 1.

Claim 14 (Currently Amended): A ceramic substrate comprising a conductor on a surface thereof,

wherein the ceramic substrate is a sintered aluminum nitride substrate having a disc shape and a fractured section with intergranular fracture, and

at least one rare earth element is locally distributed in triple points of crystal grains.

Claim 15 (Previously Presented): The ceramic substrate according to claim 14, wherein an average diameter of ceramic grains of said fractured section is 0.5 to 10 μm.

Claim 16 (Canceled).

Claim 17 (Previously Presented): The ceramic substrate according to claim 14, wherein the thermal conductivity of said ceramic substrate is 100 W/m·K or more.

Claim 18 (Canceled).

Claim 19 (Previously Presented): The ceramic substrate according to claim 14, wherein said ceramic substrate has a diameter of 200 mm or more.

Claim 20 (Previously Presented): The ceramic substrate according to claim 14, wherein said ceramic substrate has a diameter of 300 mm or more.

Claim 21 (Previously Presented): The ceramic substrate according to claim 14, wherein said ceramic substrate has a thickness of 25 mm or less.

Claims 22-25 (Canceled).

Claim 26 (Previously Presented): A semiconductor producing/examining device comprising the ceramic substrate according to Claim 14.

Claim 27 (New): The ceramic substrate according to claim 1,

wherein at least one member selected from the group consisting of B, Na, Ca, Si and O is locally distributed in said triple points of crystal grains.

Claim 28 (New): The ceramic substrate according to claim 1, wherein Y and O are locally distributed in said triple points of crystal grains.

Claim 29 (New): The ceramic substrate according to claim 1, wherein Y, O and Si are locally distributed in said triple points of crystal grains.

Claim 30 (New): The ceramic substrate according to claim 1, wherein said conductor is a resistance heating element.

Claim 31 (New): The ceramic substrate according to claim 1, wherein said ceramic substrate is configured to be used at a temperature of 200°C or higher.

Claim 32 (New): The ceramic substrate according to claim 14, wherein at least one member selected from the group consisting of B, Na, Ca, Si and O is locally distributed in said triple points of crystal grains.

Claim 33 (New): The ceramic substrate according to claim 14, wherein Y and O are locally distributed in said triple points of crystal grains.

Claim 34 (New): The ceramic substrate according to claim 14, wherein Y, O and Si are locally distributed in said triple points of crystal grains.

Claim 35 (New): The ceramic substrate according to claim 14, wherein said conductor is a resistance heating element.

Claim 36 (New): The ceramic substrate according to claim 14, wherein said ceramic substrate is configured to be used at a temperature of 200°C or higher.

Claim 37 (New): The ceramic substrate according to claim 1,

wherein the thermal conductivity of said ceramic substrate is 170 W/m·K or more.

Claim 38 (New): The ceramic substrate according to claim 14,

wherein the thermal conductivity of said ceramic substrate is 170 W/m·K or more.

BASIS FOR THE AMENDMENT

Independent Claims 1 and 14 have been amended to recite the shape of the substrate and to further define the presence of the rare earth element in the claimed ceramic substrate. Support for the amendment is found on page 6, lines 21-31 wherein it is disclosed that an impurity element may exist in an impurity-existent area and the impurity element is locally distributed in the triple points of the crystal grain. The impurity element is identified as a rare earth element at page 6, lines 5-6. Support for the shape of the ceramic substrate is found on page 15, line 29. Claims 1-2, 4, 6-8, 13-15, 17, 19-21, and 26-38 are active in the present application. Claims 3, 5, 9-12, 16, 18 and 22-25 are canceled claims. Claims 27-38 are new claims. Support for new Claims 27 and 32 is found on page 6, lines 2-8. Support for new Claims 28-29 and 33-34 is found on page 6, lines 17-20. Support for new Claims 30 and 35 is found on page 15, lines 20-22. Support for new Claims 31 and 36 is found on page 10, lines 23-26. Support for new Claims 37 and 38 is found in Table 2 and in previous Claim 17. No new matter is believed to have been added by this amendment.

REQUEST FOR RECONSIDERATION

Applicants thank Examiner Williams for the helpful and courteous discussion of September 10, 2004. During the discussion it was indicated that an interview may be granted subsequent to filing a response and prior to issuance of a non-final office action.

In one aspect of the invention described in the present specification, ceramic substrates having a conductor formed inside of or on the surface of the substrate are described. In the embodiments claimed in present independent Claims 1 and 14 an impurity element is locally distributed in the triple points of the crystal grain (page 6, lines 21-24). The impurity element is evident in a magnified view of a ceramic substrate (see Figure 17 of the application and page 6, lines 21-24).

In the claimed ceramic substrate the presence of the impurity element locally distributed in the triple points of the crystal grains provides a fracture toughness value and thermal conductivity greater than what may otherwise be provided in the absence of such a structure (page 7, lines 3-6). The difference in physical properties may be due to the suppression of expansion of cracks in the ceramic substrate (page 7, line 6). This expansion suppression may be due to ceramic grains contacting one another at grain boundaries other than the triple points. The presence of impurity elements at the triple points may increase their thermal conductivity (page 7, lines 7-10).

The Office rejected the claims of the Amendment and Request for Reconsideration filed in the present case on January 8, 2004 as anticipated by the disclosure of a patent to Katsuda (U.S. 6,001,760). The Katsuda patent is drawn to an aluminum nitride sintered body, a metal embedded article, an electronic functional material and an electrostatic chuck (see Title). Katsuda discloses the following with regard to the presence of rare earth elements at the triple point:

> [R]are earth elements remaining at boundaries and triple points of each aluminum nitride crystal grain form an intergranular phase. This

> intergranular phase disorders the crystal lattice near the grain boundary of each aluminum nitride crystal grain adjacent to others, and loosens adhesion between crystal grains. It is considered that the decrease of the volume resistivity of the sintered body has so far been impeded by such disordering at each grain boundary of crystal grains. In the aluminum nitride sintered bodies according to the present invention, even the disorder of atom arrangement at the aluminum nitride crystal grain boundary can hardly be seen (column 4, line 60 – column 5, line 12).
>
> Further, the present inventors have investigated the triple point (triple point formed by three aluminum nitride crystal grains) in the aluminum nitride sintered bodies, and found that the crystalline phase at the triple point substantially does not contain rare earth elements. From this result, it is conjectured that the rare earth elements exist, as an extremely thin amorphous phase, near the surface or on the surface of each aluminum nitride crystal grain. Even at the triple point, it has been found that rare earth elements exist only near the surface or on the surface of the crystal grains (column 7, lines 30-39).

The invention aluminum nitride of Katsuda is therefore not described as containing rare earth elements locally distributed in the triple points. If rare earth elements are present in the compositions they are present "as an extremely thin amorphous phase, near the surface or on the surface of each aluminum nitride crystal grain."

Applicants note that in the claimed invention the rare earth element may be locally distributed in the triple points of crystal grains (see for example page 13, lines 7-15) whereas in Katsuda, when a rare earth impurity is present, it is present on the surface of the crystal grains (column 22, lines 6-9).

Applicants submit that the difference in the presence of the rare earth elements between the invention presently claimed and the disclosure of Katsuda is reflected in the difference between the thermal conductivities of the Katsuda aluminum nitride and the presently claimed ceramic substrate. Katsuda discloses "the aluminum nitride sintered bodies have hitherto been studied as electrically insulating material with a high thermal conductivity" (column 6, lines 53-54). It appears that Katsuda discloses that thermal conductivity is improved by decreasing the amount of oxygen remaining in the grains:

> Namely, it has been considered that the oxygen atoms are a kind of impurities which remain in the aluminum nitride crystal grains even after sintering. Accordingly, a study to decrease the amount of oxygen remaining in the grains has been conducted in order to improve the thermal conductivity of sintered bodies (column 4, lines 41-46).

The thermal conductivity (W/m·K) of the inventive compositions of Katsuda are provided for a number of examples in the Tables of the patent. Nowhere in the tables of Katsuda is an inventive example disclosed having a thermal conductivity greater than 120 W/m·K. This may be compared with the thermal conductivities of the inventive Examples of Tables 1 and 2 of the present application which are as high as 190 W/m·K. New dependent Claims 37 and 38 require that the thermal conductivity of the claimed ceramic substrates is 170 W/m·K or greater.

Applicants submit that present independent Claims 1 and 14 are not anticipated by Katsuda because Katsuda does not disclose a ceramic substrate wherein a rare earth element is locally distributed in triple points. Applicants submit the presently claimed invention is not obvious in view of Katsuda on the grounds that (i) the combination of Katsuda and Natsuhara (U.S. 6,458,444) does not disclose all of the present claim limitations, namely the presence of the rare earth element in the triple points, and (ii) the significantly higher thermal conductivity exhibited by the claimed invention in comparison to the aluminum nitride bodies of Katsuda. Moreover, Applicants submit that Natsuhara does not disclose or suggest a disc-shaped ceramic substrate. The substrate shown, for example, in Figure 5 of Natsuhara is rectangular in configuration.

Applicants submit that present independent Claims 1 and 14 are novel and not obvious in view of the prior art relied upon by the Office and respectfully requests the withdrawal of the rejections.

Respectfully submitted,

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